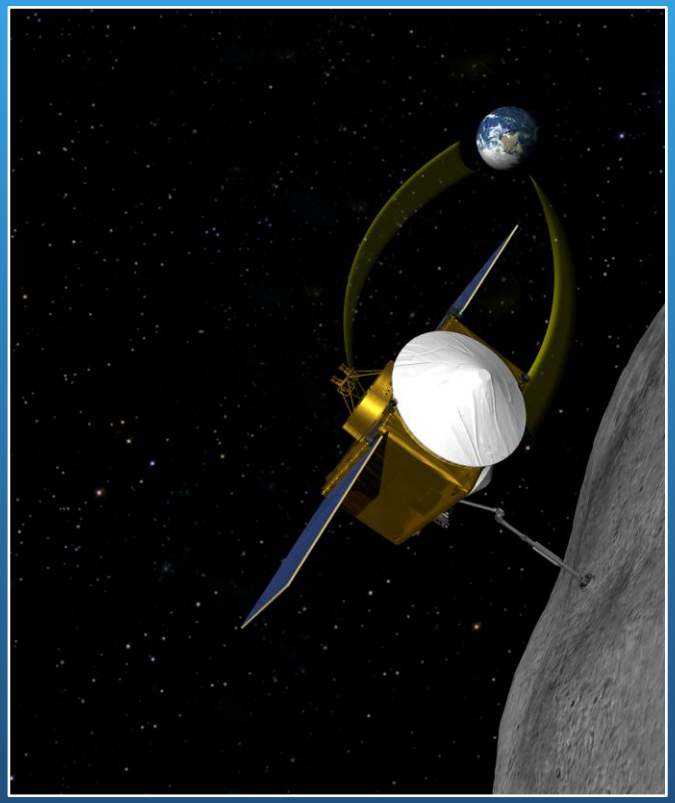
You want to go WHERE?

Designing the OSIRIS-REx Asteroid Sample Return Mission

The Challenge of Discovery
Educator Workshop April 6, 2013
Cat Merrill, Ellyne Kinney Spano, Bashar Rizk

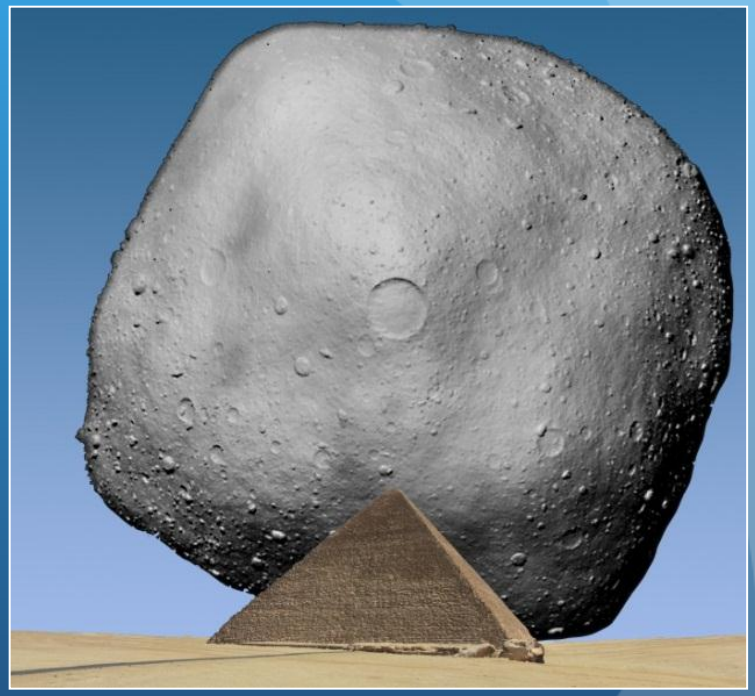
OSIRIS-REx Mission



- Asteroid Sample Return
- Launch 2016
- Rendezvous 2018
- Sampling 2019
- Return 2023

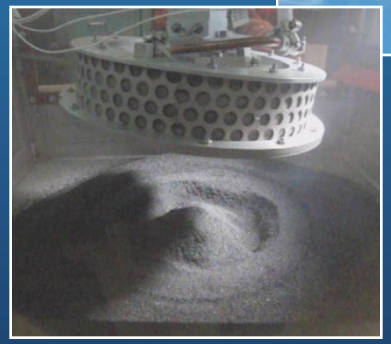
Asteroid Fast Facts

- Near-Earth asteroid
- About 500 meters (⅓ mile) diameter
- 4.3-hour rotation period
- 436.6-day orbit of Sun at 27.8 km/s (62,120 mph)
- Collection of materials into a rubble pile
- Ancient carbon and volatiles such as water
- Potential hazard to Earth

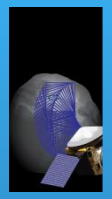


Spacecraft Fast Facts

- 2 meters per side (6.6 feet)
- 8.5 m^2 of solar panels (91 square feet)
- 5 Instruments
- Touch-and-Go Sampler
- Sample Return Capsule



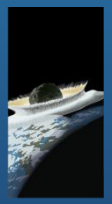
What do scientists want to do?



Map the asteroid

Sample the asteroid and document the sample site

Return the sample and analyze it



Take measurements of the asteroid's orbit

Compare information to telescope observations

Who makes it happen?

Cat Merrill (Cat) arrived at the University of Arizona after working on the Missile Defense Program for 10 years. Cat has a MS Optics from the University of Arizona.

As the lead systems engineer, Cat works to define the necessary functions of the cameras and how they work together. Cat is also responsible for the definition of the interface between OCAMS and the OSIRIS-REx spacecraft.

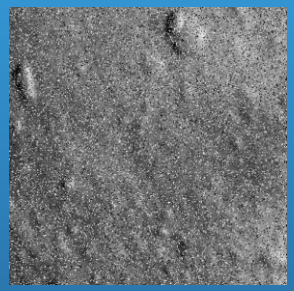
Who makes it happen?

Bashar Rizk is an OSIRIS-REx Co-Investigator and OCAMS Deputy Instrument Scientist; he also works as an OCAMS Systems Engineer.

His job is to ensure that OCAMS requirements and design satisfy the science goals. He consults on a daily, weekly or monthly basis with all discipline and interdisciplinary engineers and scientists to accomplish this.

Who makes it happen?

Ellyne Kinney Spano, Imaging Scientist



Raw Image

Color Image

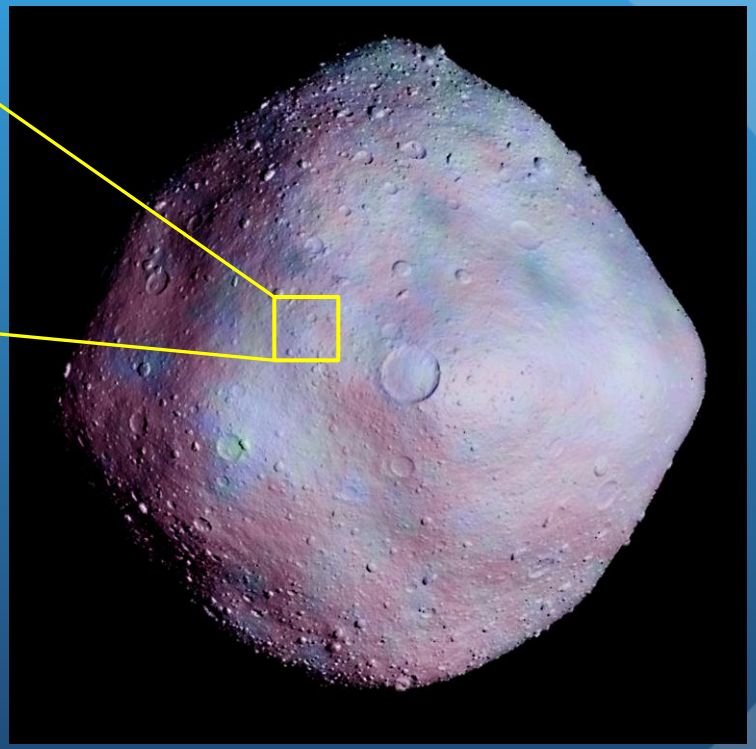
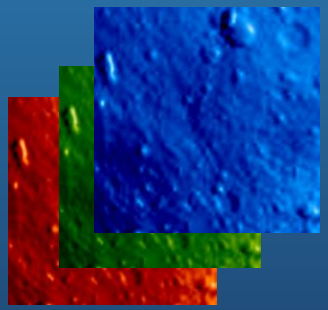


Image Mosaic

Corrected Image

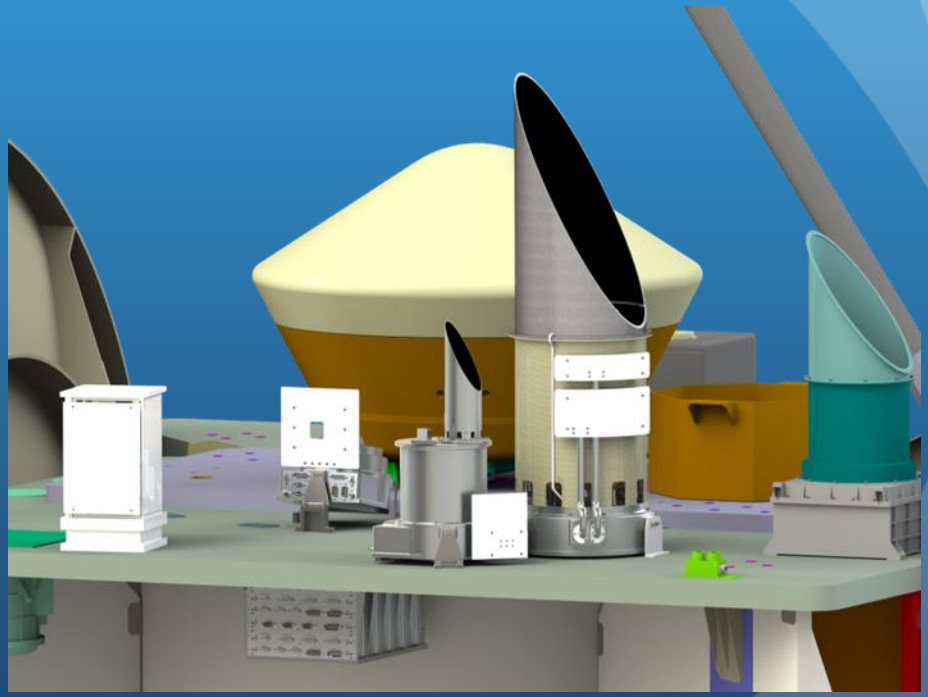


Color bands

OSIRIS-REx Camera Suite (OCAMS)

Three cameras and one electronics box that interfaces with the spacecraft

- PolyCam acquires asteroid and reconnoiters sample site
- MapCam maps the asteroid in several colors and helps determine its shape
- SamCam verifies success of sampling event



Engineering and Design: The Iterative Process

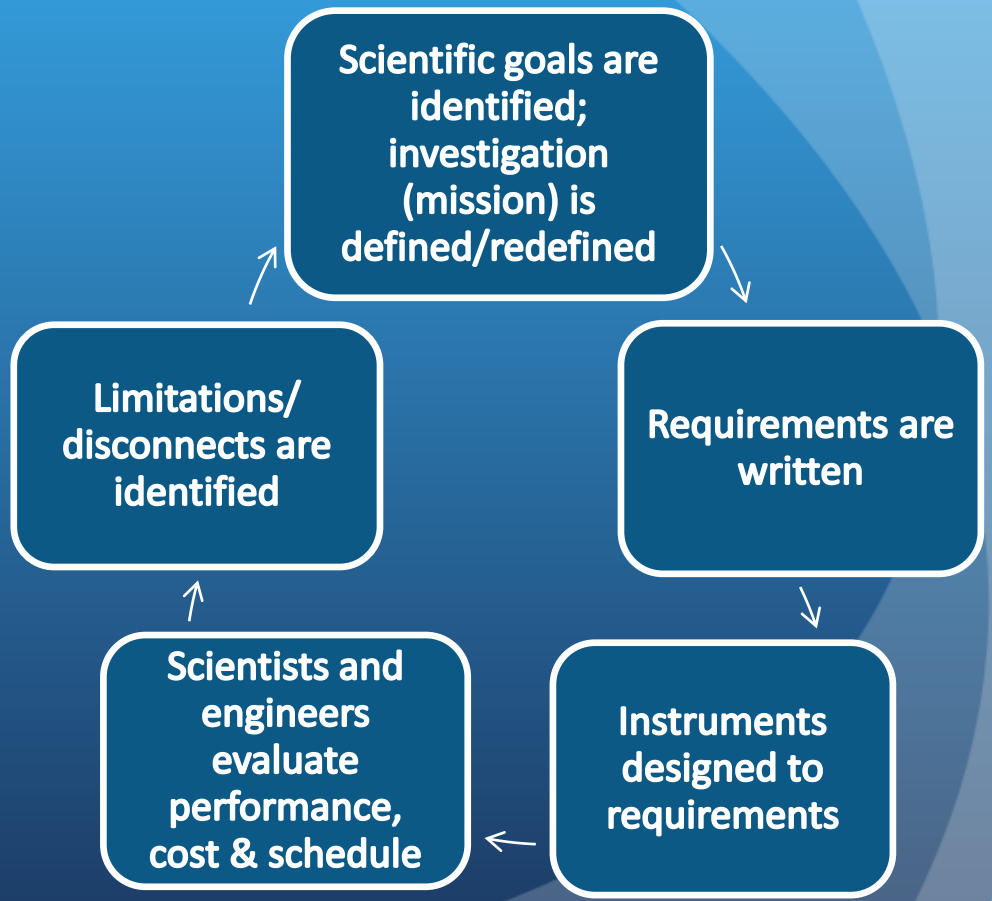
Scientist-Designed Projects

Scientists and engineers propose investigation and secure funding

They design, build and test apparatus

They analyze results of investigation

Modern Design Process



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